VIIRS-related terms to be changed/Added in next update to NPOESS Glossary

Pixel *[new term]*
Contraction of "picture element". In general, a pixel is defined as the smallest unit of information in a grid cell map or image. As applied to VIIRS, a pixel is defined as an individual sample of measured scene data at the finest resolution of the instrument in the mode in which it is operating. A pixel may be generated from one or more detector samples by aggregation, re-sampling, and/or any other data processing operations consistent with meeting the explicit and derived requirements for pixel radiometric, spatial, and temporal response characteristics. However, re-sampling is allowed only if required to implement aggregation of pixels from multiple detector samples (TBR). Depending on the degree of processing applied to the raw detector samples, a pixel may be dimensionless, e.g., a "digital number", or may have units of radiance or reflectance. The spatial extent on the ground of a pixel (or pixel footprint) is determined by the two-dimensional system point spread function (or point source response function) associated with the pixel. In particular, the pixel width in the in-track (cross-track) direction is given by the horizontal spatial resolution (HSR) in the in-track (cross-track) directions. (See "Horizontal Spatial Resolution" and "Pixel Width".) The pixel location (or pixel footprint location) on the ground is the ground location at which the point spread function associated with the pixel has a maximum. (See "Pixel Location".)

Pixel Footprint [*new term*]
The region on the ground associated with, or predominantly contributing to, the pixel information. The location and spatial extent of the pixel footprint are determined by the system point spread function associated with the pixel. (See "Pixel Width" and "Pixel Location".)

Pixel Location (or Pixel Footprint Location) [*new term*]
The pixel location (or pixel footprint location) is defined as the point on the ground at which the system point spread function associated with the pixel has a maximum. If the point spread function achieves its maximum over a finite region rather than at a point, then the pixel location is the centroid of this region.

Pixel Width (or Pixel Footprint Width) [*new term*]
The pixel width in the in-track (cross-track) direction is defined as the horizontal spatial resolution (HSR) in the in-track (cross-track) direction. Other terms having the same meaning as "pixel width" are "pixel size", "pixel extent", "pixel dimension", and "pixel HSR".

Horizontal Spatial Resolution [*old term, new definition*]
For a scanning imager on a space-based platform, a specified band, and a specified nadir angle, one half of the spatial wavelength corresponding to the earth surface spatial frequency at which the end-to-end system modulation transfer function (MTF) equals 0.5 on the in-track spatial frequency axis or cross-track spatial frequency axis, whichever is specified. The in-track (cross-track) spatial frequency is the earth surface spatial frequency associated with the in-track (cross-track) direction. "End-to-end" in this definition means from photons collected by the sensor to calibrated radiances provided as part of the explicit Imagery EDR or within SDRs used to generate other EDRs. The effects of all signal and data processing functions performed in the course of generating these calibrated radiances, e.g., sample aggregation, re-sampling, image enhancement, image restoration, etc., are included in the HSR. (See definition of Modulation Transfer Function.)

Modulation Transfer Function (MTF) [*not new or changed, repeated here for reference*]
The magnitude of the Fourier transform of the end-to-end system point spread function (PSF).). The MTF is a function of two spatial frequencies associated with two orthogonal spatial directions, and is equal to one at the origin by virtue of the normalization condition on the PSF.

System Point Spread Function (PSF) [*not new or changed, repeated here for reference*]
The end-to-end system response due to a point source at infinity in a given bandpass. In this TRD the PSF is considered to be a function of distance along the ground in two orthogonal directions. (A point source on the ground is considered to be "at infinity".) The PSF is normalized so that the two dimensional integral over the two orthogonal distance variables is equal to one. For a linear system, the system PSF can be

expressed as a multiple convolution of the PSFs associated with all system components that contribute to the conversion of input radiance to the system output, e.g., the optics, detectors, signal and data processing.

Reflectance (Band Integrated, Top of the Atmosphere (TOA)) [*new term*]
The band-integrated TOA reflectance ($\rho(\theta,\varphi;\theta_s,\varphi_s)$) is defined as follows:

$$\rho(\theta,\varphi;\theta_s,\varphi_s) = \frac{\pi \int_0^\infty L(\theta,\varphi;\lambda)\, R(\lambda)\, d\lambda}{\int_0^\infty E(\lambda)\, R(\lambda)\, d\lambda\, \cos(\theta_s)}$$

where
θ = zenith angle of the observing sensor,
φ = azimuth of the observing sensor,
θ_s = zenith angle of the illuminating source (e.g., the sun or moon).
φ_s = azimuth of the illuminating source,
λ = wavelength,
$L(\theta,\varphi;\theta_s,\varphi_s)$ = TOA spectral radiance in the direction of the observing sensor,
$E(\lambda)$ = irradiance due to the illuminating source orthogonal to the line of sight to the illuminating source,
$R(\lambda)$ = relative spectral response function of the sensor in the band of interest.
Unless otherwise indicated, the unmodified term "reflectance" as used in the SRD refers to the band-integrated, TOA reflectance defined above.

Not-to-Exceed [*new term*]
A "not-to-exceed" value for a specified parameter is the maximum acceptable value of the parameter.

Target [*new term*]
A "target" value for a specified parameter is the maximum (minimum) of the range of preferred values for the parameter, where lower (higher) values of the parameter provide better performance or are otherwise more desirable. A design value falling between the target and goal values is desired by the government, and a value closer to the goal than the target is generally preferred, depending upon the impacts associated with approaching the goal. (See "goal".)

Goal [*new term*]
A "goal" value for a specified parameter is the minimum (maximum) of the range of preferred values for the parameter, where lower (higher) values of the parameter provide better performance or are otherwise more desirable. A design value falling between the target and goal values is desired by the government, and a value closer to the goal than the target is generally preferred, depending upon the impacts associated with approaching the goal. (See "target".)

Polarization Sensitivity (or Polarization Factor) [*new term*]
The polarization sensitivity (or polarization factor) (PF) is defined as:

$PF = (I_{max} - I_{min})/(I_{max} + I_{min})$

where
I_{max} = maximum measured radiance for linearly polarized source radiance for which the plane of polarization contains the line of sight and has any orientation about the line of sight.
I_{min} = minimum measured radiance for linearly polarized source radiance for which the plane of polarization contains the line of sight and has any orientation about the line of sight.

Co-Registration of Spectral Bands [*new term*]
Co-registration of spectral bands is measured by the displacement of corresponding pixels in two different bands from their ideal relative location. Two pixels are "corresponding" if their footprints should ideally coincide or if the footprint of one should ideally lie within a specific region of the footprint of the other. If co-registration is specified by a single value, this value is the upper bound on the magnitude of the displacement of the locations of corresponding pixels in any direction.

Root-Mean-Square Error (RMSE)
The root-mean-square error (RMSE) is defined as the square root of the sum of the squares of the measurement errors associated with a set of measurements or estimates. (See "measurement error".)

Haze
Fine dust, salt particles, smoke, or water particles (finer and more scattered than those of fog) dispersed though a part of the atmosphere, causing a lack of transparency of the air (which assumes a characteristic opalescent appearance that subdues all colors) and reducing the horizontal visibility of distant objects to more than one but less than two kilometers.
(from Gary, M., R. McAfee and C. Wolf, Glossary of Meteorology , American Geological Institute, Washington, D.C. (1974))